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National Semiconductor

February 1995

LM1877
Dual Audio Power Amplifier

General Description

The LM1877 is a monolithic dual power amplifier designed to deliver 2W/channel continuous into 8Ω loads. The LM1877 is designed to operate with a low number of external components, and still provide flexibility for use in stereo phonographs, tape recorders and AM-FM stereo receivers, etc. Each power amplifier is biased from a common internal regulator to provide high power supply rejection, and output Q point centering. The LM1877 is internally compensated for all gains greater than 10.

Features

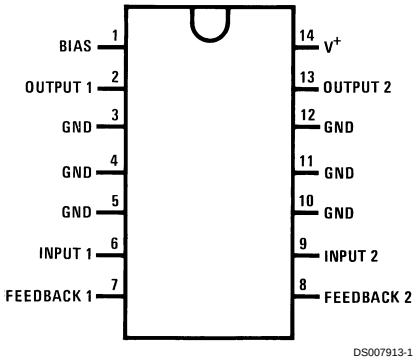
- 2W/channel
- −65 dB ripple rejection, output referred
- −65 dB channel separation, output referred
- Wide supply range, 6V–24V
- Very low cross-over distortion
- Low audio band noise
- AC short circuit protected
- Internal thermal shutdown

Applications

- Multi-channel audio systems
- Stereo phonographs
- Tape recorders and players
- AM-FM radio receivers
- Servo amplifiers
- Intercom systems
- Automotive products

Connection Diagram

Dual-In-Line Package
or Surface Mount Package



Top View
Order Number LM1877M-9 or LM1877N-9
See NS Package Number M14B or N14A

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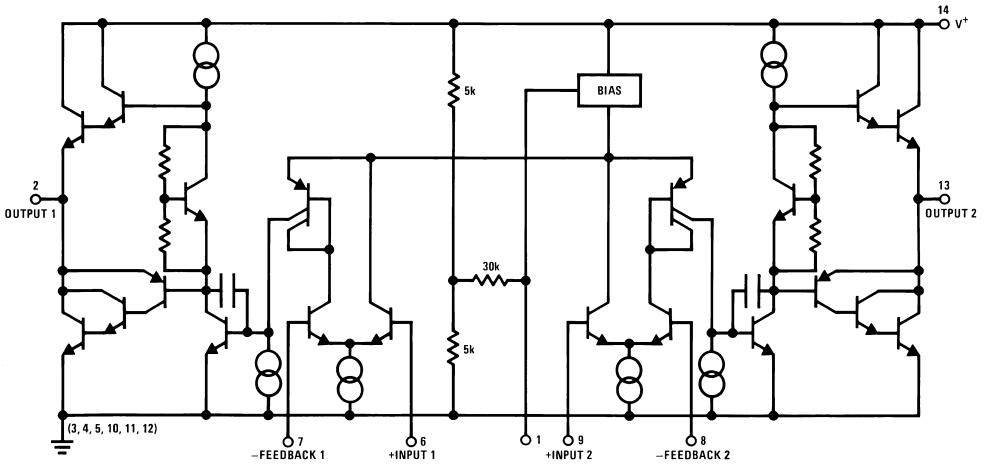
Equivalent Schematic Diagram



DS007913-2

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage	26V
Input Voltage	±0.7V
Operating Temperature	0˚C to +70˚C
Storage Temperature	−65˚C to +150˚C
Junction Temperature	150˚C
Lead Temperature	
N-Package Soldering (10 sec.)	260˚C
M-Package Infared (15 sec.)	220˚C
M-Package Vapor Phase (60 sec.)	215˚C
Thermal Resistance	
θ_{JC} (N-Package)	30˚C/W
θ_{JA} (N-Package)	79˚C/W
θ_{JC} (M-Package)	27˚C/W
θ_{JA} (M-Package)	114˚C/W

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits.

Electrical Characteristics

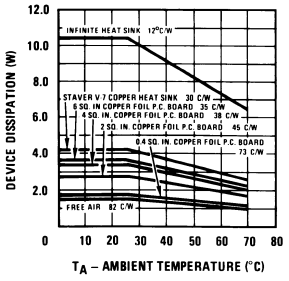
V_S = 20V, T_A = 25˚C, (Note 2) R_L = 8Ω, A_V = 50 (34 dB) unless otherwise specified

Parameter	Conditions	Min	Typ	Max	Units
Total Supply Current	P_O = 0W		25	50	mA
Output Power	THD = 10%				
LM1877	V_S = 20V, R_L = 8Ω	2.0			W/Ch
	V_S = 12V, R_L = 8Ω		1.3		W/Ch
Total Harmonic Distortion					
LM1877	f = 1 kHz, V_S = 14V				
	P_O = 50 mW/Channel		0.075		%
	P_O = 500 mW/Channel		0.045		%
	P_O = 1 W/Channel		0.055		%
Output Swing	R_L = 8Ω		V_S −6		Vp-p
Channel Separation	C_F = 50 µF, C_{IN} = 0.1 µF, f = 1 kHz, Output Referred				
	V_S = 20V, V_O = 4 Vrms	−50	−70		dB
	V_S = 7V, V_O = 0.5 Vrms		−60		dB
PSRR Power Supply Rejection Ratio	C_F = 50 µF, C_{IN} = 0.1 µF, f = 120 Hz, Output Referred				
	V_S = 20V, V_{RIPPLE} = 1 Vrms	−50	−65		dB
	V_S = 7V, V_{RIPPLE} = 0.5 Vrms		−40		dB
Noise	Equivalent Input Noise				
	R_S = 0, C_{IN} = 0.1 µF, BW = 20 Hz–20 kHz, Output Noise Wideband		2.5		µV
	R_S = 0, C_N = 0.1 µF, A_V 200		0.80		mV
Open Loop Gain	R_S = 0, f = 100 kHz, R_L = 8Ω		70		dB
Input Offset Voltage			15		mV
Input Bias Current			50		nA
Input Impedance	Open Loop		4		MΩ
DC Output Level	V_S = 20V	9	10	11	V
Slew Rate			2.0		V/µs
Power Bandwidth			65		kHz
Current Limit			1.0		A

Note 2: For operation at ambient temperature greater than 25˚C, the LM1877 must be derated based on a maximum 150˚C junction temperature.

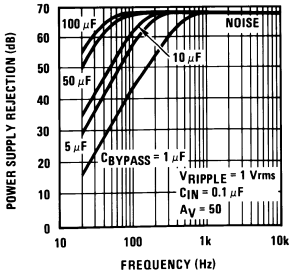
Typical Performance Characteristics

Device Dissipation vs Ambient Temperature


INFINITE HEAT SINK 12°C/W
STAVER V-7 COPPER HEAT SINK 30 C/W
6 SQ. IN COPPER FOIL P.C. BOARD 35 C/W
4 SQ. IN. COPPER FOIL P.C. BOARD 38 C/W
2 SQ. IN. COPPER FOIL P.C. BOARD 45 C/W
0.4 SQ. IN. COPPER FOIL P.C. BOARD 73 C/W
FREE AIR 82 C/W
DEVICE DISSIPATION (W)
12.0
10.0
8.0
6.0
4.0
2.0
0
10 20 30 40 50 60 70 80
TA – AMBIENT TEMPERATURE (°C)

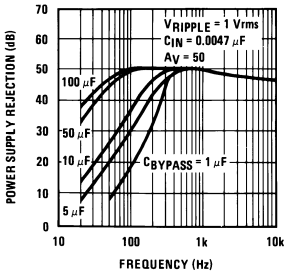
DS007913-10

Power Supply Rejection Ratio (Referred to the Output) vs Frequency



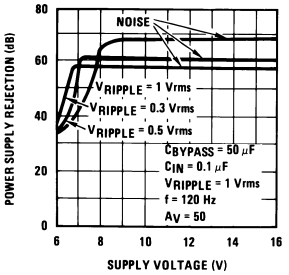
DS007913-11

Power Supply Rejection Ratio (Referred to the Output) vs Frequency



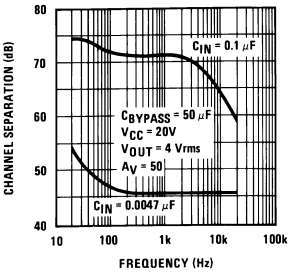
DS007913-12

Power Supply Rejection Ratio (Referred to the Output) vs Supply Voltage



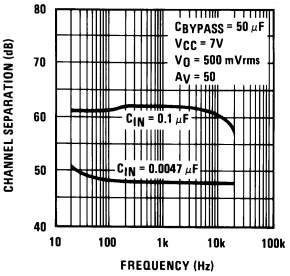
DS007913-13

Channel Separation (Referred to the Output) vs Frequency



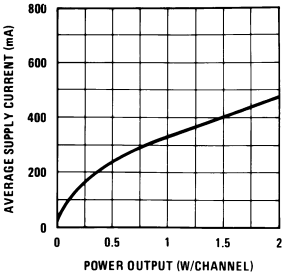
DS007913-14

Channel Separation (Referred to the Output) vs Frequency



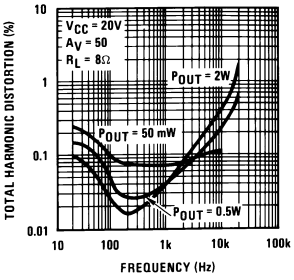
DS007913-15

Average Supply Current vs P_{OUT}



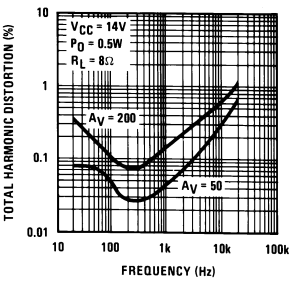
DS007913-16

Total Harmonic Distortion vs Frequency



DS007913-17

Total Harmonic Distortion vs Frequency



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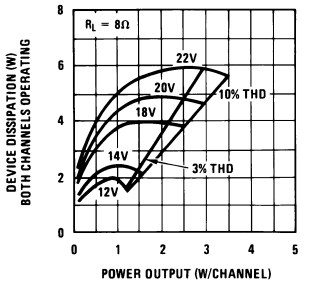
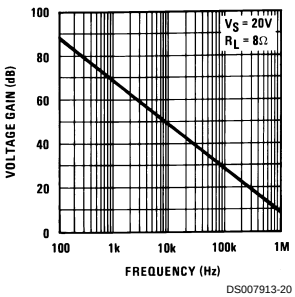
Typical Performance Characteristics (Continued)

Power Dissipation (W) Both Channels Operating



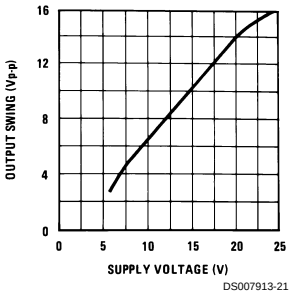
DS007913-19

Open Loop Gain vs Frequency



DS007913-20

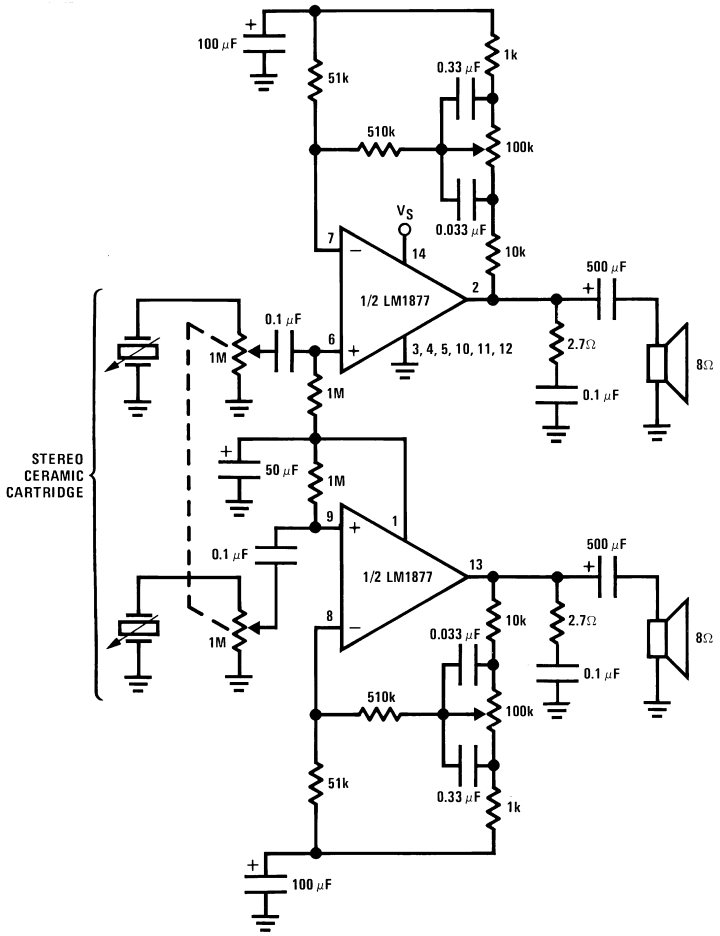
Output Swing vs Supply Voltage



DS007913-21

Typical Applications

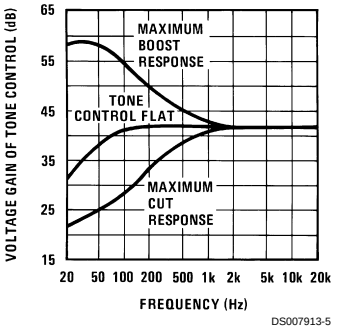
Stereo Phonograph Amplifier with Bass Tone Control



DS007913-4

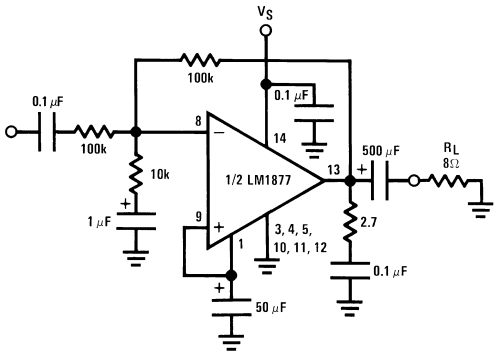
Typical Applications (Continued)

Frequency Response of Bass Tone Control



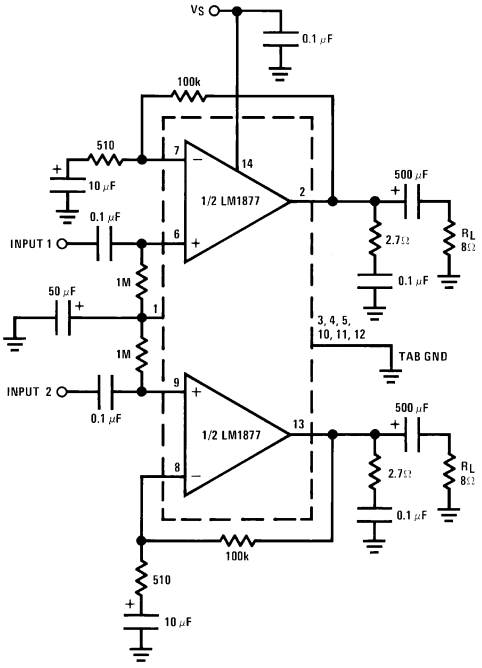
DS007913-5

Inverting Unity Gain Amplifier



DS007913-6

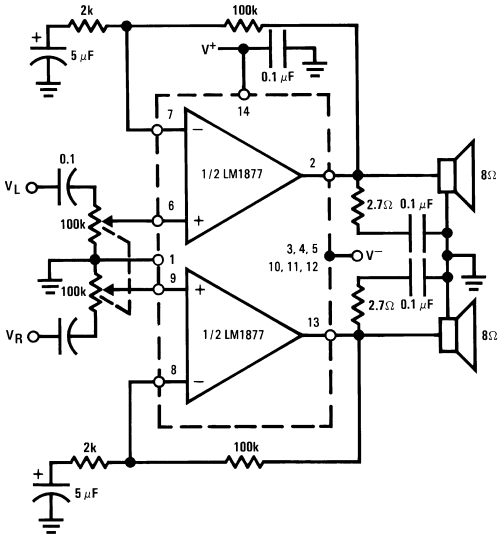
Stereo Amplifier with A_V = 200



DS007913-7

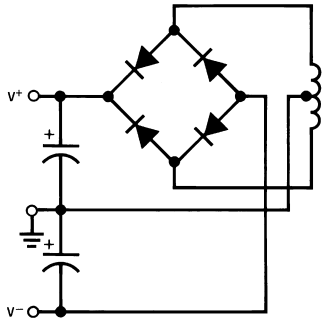
Typical Applications (Continued)

Non-Inverting Amplifier Using Split Supply



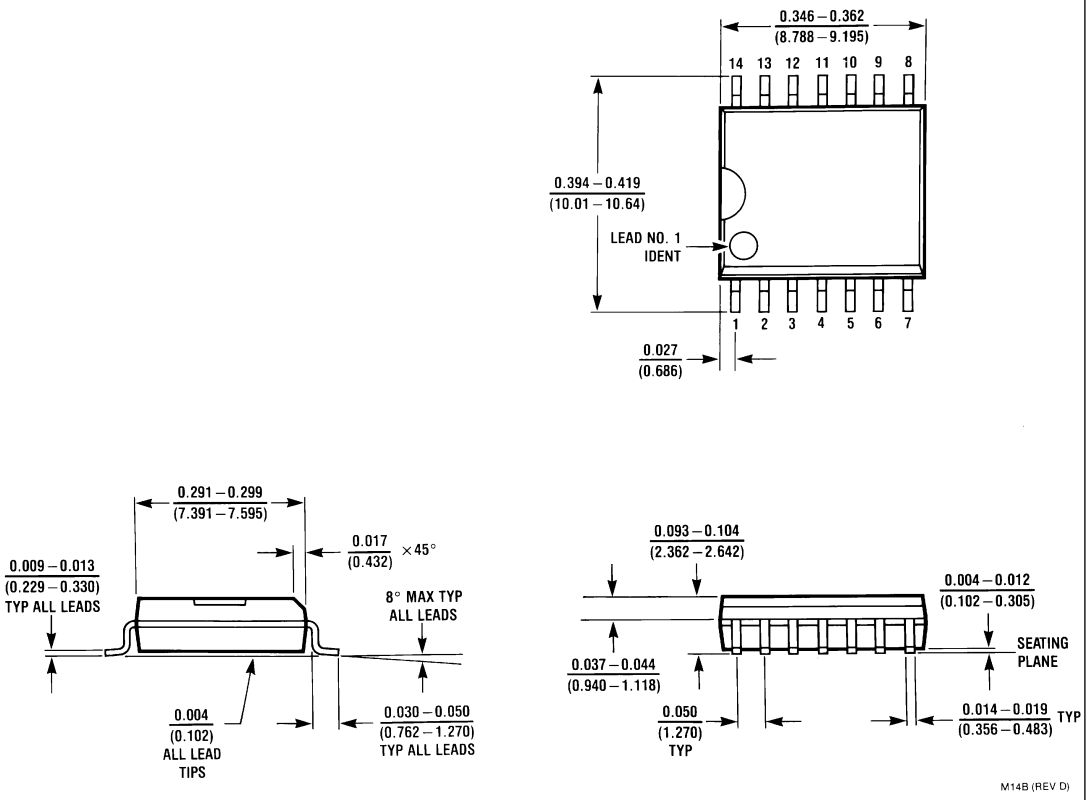
DS007913-8

Typical Split Supply



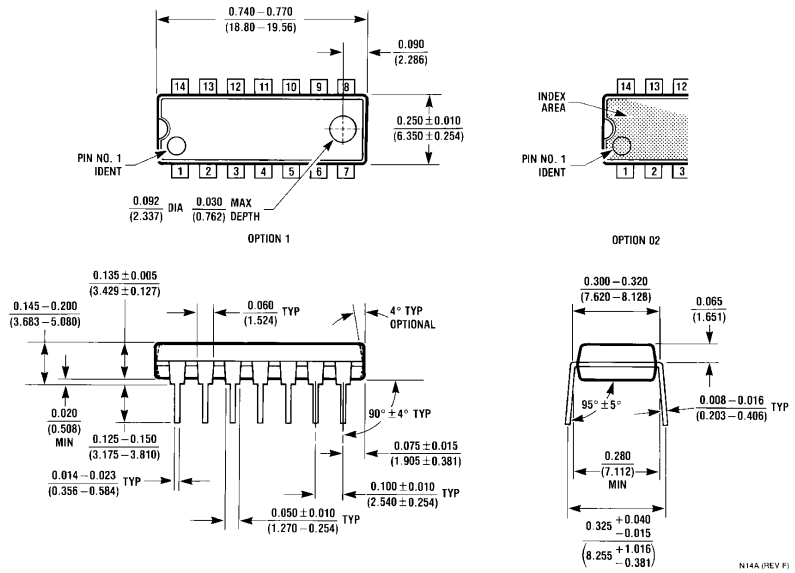
DS007913-9

Physical Dimensions inches (millimeters) unless otherwise noted



Molded SOIC Package (M)
Order Number LM1877M-9
NS Package Number M14B

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



Molded Dual-In-Line Package (N)
Order Number LM1877N-9
NS Package Number N14A

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